



Draft MI Healthy Climate Plan

JANUARY 14, 2022

Department of
Environment, Great Lakes, and Energy



MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

Letter from EGLE Director

Dear fellow Michiganders:

I am proud to present the following draft MI Healthy Climate Plan with thanks to Governor Gretchen Whitmer for trusting the Michigan Department of Environment, Great Lakes, and Energy (EGLE) to lead this work and deep appreciation for the hundreds of Michiganders who contributed to it over the past year through thousands of hours of research, reflection, and conversation.

This plan lays out a broad vision for fulfilling the governor's fall 2020 commitment for Michigan to achieve 100% economy-wide carbon neutrality by mid Century – the global science-based benchmark for reducing greenhouse gas emissions to avoid the most devastating and costly impacts of climate change.

As its name suggests, this is first and foremost a Michigan plan. While climate-related forces beyond our two peninsulas will challenge and shape our future in the coming decades, the historic transition to carbon neutrality also presents Michigan opportunities to advance equity, create good paying jobs, increase economic competitiveness, and improve our quality of life by protecting our air quality and the Great Lakes. This plan positions Michigan to seize those opportunities by taking maximum advantage of what makes the Great Lakes State unique, including our unmatched freshwater resources and heritage as a global manufacturing innovator, diverse agricultural producer, world-class outdoor recreation hub, and home to talented people and vibrant communities.

It is a plan that was shaped by a multitude of Michiganders with varied perspectives on how to respond to climate change. As detailed in the introduction, the plan was shaped by hundreds of residents – as appointees to the Council on Climate Solutions, members of the equity-focused Climate Justice Brain Trust, volunteers on the Council's five come-one-come-all workgroups, participants in public listening sessions, state employees from various agencies, and commenters who shared ideas and perspectives via the Council's webpage and email.

We heard from environmental justice, public transit, and local food advocates; an array of business executives and labor leaders; academic experts and local government officials; and concerned residents of all political persuasions and walks of life. I am deeply grateful to everyone who invested their time, energy, and passion in this process. I firmly believe that conversation leads to better outcomes. In this case, I think the outcome is a plan that a broad cross-section of Michiganders can rally around.

Finally, this is a Michigan plan to be implemented by Michiganders. It holds promise for our state in the face of immediate and future climate challenges. All 10 million of us have big parts to play in decarbonizing our economy – from the governor and state lawmakers who will make the necessary state policy changes and budgetary decisions

to the engineers and entrepreneurs who will turn cutting edge climate solutions into high-quality jobs and economic prosperity; the community leaders and advocates who will ensure this work reaches every corner of the state and benefits every Michigan family; and each of us as individuals and consumers who will take myriad actions in response to climate change in our daily lives.

This plan does not fill in every detail or prescribe every action that will lead Michigan to a 52% reduction by 2030 and 100% carbon neutrality by 2050. As you will see in the innovation and engagement sections of the plan, it leaves plenty of space for us to show creativity and ingenuity in how we fulfill its vision and meet the governor's commitment. We also know full well that, in a context as fluid as climate change, this plan will become dated quicker than we can get the document printed and posted. It is intended as a living document that we and future generations will continue improving.

It is essential that we act now to greatly accelerate the decarbonization of Michigan's economy, building on the progress Michigan has recently made thanks to leadership in both our public and private sectors. As the plan lays out, some of the solutions to get to a 100% decarbonized economy that delivers good jobs and justice for Michiganders are still very much on the drawing board. But much of the path to carbon neutrality is already well known to us. While there are complexities in every aspect of this plan, most can be overcome if we simply commit to getting the job done and equitably sharing the burdens and benefits.

So, let's get to work.

Sincerely,

A handwritten signature in blue ink, appearing to read "Liesl Eichler Clark", is positioned above the typed name.

Liesl Eichler Clark, Director
Michigan Department of Environment, Great Lakes, and Energy

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Introduction

Governor Whitmer's commitment to achieving 100% carbon neutrality by 2050 and position Michigan as a global leader in addressing climate change.

In September 2020, Governor Gretchen Whitmer signed Executive Directive 2020-10, which committed Michigan to a goal of achieving economy-wide carbon neutrality no later than 2050 (and maintaining net negative GHG emissions thereafter). In doing so, she reaffirmed the goals in Executive Directive 2019-12 which committed Michigan to pursue at least a 26-28% reduction below 2005 levels in greenhouse gas (GHG) emissions by 2025. In addition to the goals set by these directives, Michigan joined 24 other states and Puerto Rico – under the umbrella of the US Climate Alliance – in committing to an interim goal of a 52% GHG reduction by 2030.

Executive Directive 2020-10 charged the Michigan Department of Environment, Great Lakes, and Energy (EGLE), through its Office of Climate and Energy, with developing the *MI Healthy Climate Plan* (Plan). The Plan will serve as this state's action plan to reduce greenhouse gas emissions and transition toward economy-wide carbon neutrality.

Climate change is an urgent global challenge that is already impacting Michigan in unique ways.

Our state's abundant freshwater resources, mild temperatures, and pleasant quality of life make Michigan a special place to live, work, and play. When we see news coverage from around the country of devastating fires, empty reservoirs, and rising seas – not to mention increasingly frequent and extreme hurricanes and tornadoes – it is easy to understand why people might migrate to Michigan to be buffered from the most dramatic impacts of climate change. However, while Michigan may experience the impacts of the climate crisis differently from other places, the threats from a changing climate are already posing a range of risks to our environment and economy and inflicting real harm on our health and well-being.

Michigan communities and families are taking hit after hit from power outages, extreme heat events, flooding, and sewer backups caused by intense rains. Our farmers are struggling to adjust and survive as temporary thaws result in frozen fruit blossoms thinking spring has come early, drenching storms inundate fields one day and then disappear into extended periods with no rain at all, and new insects migrate from warmer climates each year threatening our gardens, forests, and crops. Disease-carrying ticks – in places we have never seen them and in previously unimaginable

numbers for our state – add hassles and health risks to the outdoor adventurers so many of us cherish.

All the science points to impacts like these and others continuing and getting worse as trends toward a warmer planet and more extreme weather accelerate. Periods of intense heat and cold – and more frequent and severe flooding – will impact all Michiganders.

But communities of color, low-income Michiganders, and others who have been left without the resources to withstand and respond to these events will suffer the most – unless we chart a new path. However, if we adapt nimbly and provide tools for communities to be resilient and adapt to climate change while rapidly reducing our GHG emissions, we can avoid some of the worst harms – and the deeper potential disparities or inequities – of the climate crisis.

Creating good jobs for Michigan workers, increasing our state's economic competitiveness, and improving quality of life as we pursue carbon neutrality.

The changing climate will challenge us in dramatic ways that are both easy to predict and impossible to anticipate. It is called a crisis for good reason. But it is also true that we are the front edge of a historic global transformation to a carbon neutral economy that will present us with significant opportunities if we act wisely and aggressively.

This plan points to a myriad of co-benefits that will accompany decarbonization as we position Michigan as a global leader in addressing the climate crisis. The immediate investments this Plan recommends will pay off several times over in the coming decades, not only helping to gird communities against the worst impacts of the climate crisis but also saving Michigan residents real money, propelling our workforce and economy forward, and otherwise improving our health and quality of life.

For example, businesses are increasingly focused on climate because of bottom-line economics, customer and investor expectations, and the opportunity to lead through corporate social responsibility initiatives. Here in the Great Lakes State:

- Steelcase recently announced it has become carbon neutral and has set a science-based target to become carbon negative and continue to reduce emissions 50% by 2030;¹
- Dow has set an ambitious target of being carbon neutral by 2050;² and
- Whirlpool Corporation has set a net zero emissions target in its plants and operations by 2030, including direct and power-related emissions.³

By moving to the head of the pack in responding to the climate challenge, we can help ensure homegrown companies like these will continue to invest in Michigan. Our state can also attract new business partners who are looking to locate in states on the cutting edge of decarbonization – states that embrace clean energy, advanced manufacturing, the next generation of transportation and mobility, and other climate innovations.

Perhaps most importantly, addressing climate change means new opportunities for Michigan workers. Michigan's 113,000 clean energy jobs can be found in every corner of the state and in many sectors of the economy. But given our heritage, it is no surprise the majority of these jobs are in manufacturing, or the majority of those jobs are in the auto industry. If we continue to leverage Michigan's traditional strengths and advance a bold climate agenda, we can enjoy steep growth in clean energy jobs and economic development.

As stated by the Michigan Council on Future Mobility and Electrification, changes in the transportation sector will “create new opportunities for Michigan to leverage the strength of its automotive sector to further the state's leadership and secure jobs for the next generation of electric vehicle and charging infrastructure manufacturing, strengthen our state economy through diversification into more high-tech industries that are the emerging profit pools in automotive products, provide attractive employment opportunities for a highly⁴ talented workforce, and achieve climate goals while...supporting job growth in the energy sector.”⁵

As we transition to a fully decarbonized economy, we need to identify opportunities for all Michigan workers to be a part of the clean energy future. In the pages to follow, this Plan will point to a bounty and diversity of good paying jobs we can create by:

- Retaining and attracting advanced manufacturing;
- Upgrading our power grid to withstand larger storms and accommodate innovative technologies;
- Ramping up our deployment of renewable energy;
- Building and maintaining new transportation systems, and
- Eliminating energy waste in our homes and other buildings.

Connecting these jobs to Michiganders who need the opportunities most – and providing them the training to take full advantage – will take creativity, public-sector backing, and sustained, deliberate action.

Jobs by Sector



The biggest part of Michigan's clean energy sector is energy efficiency, accounting for more than 65 percent of the region's clean energy jobs. But as more automakers and their suppliers continue to shift to electric vehicles, the advanced transportation sector saw a job increase of one (1) percent for a total of 24,268 workers.

[Clean Jobs Midwest](#)

This Plan also emphasizes the public health and other quality of life gains we can enjoy through wise and strategic decarbonization. For example, as we reduce greenhouse gas emissions, we expect to see significant reductions in other forms of air pollution. As detailed later, for example, the closure of aging coal-fired power plants and the increased adoption of solar, wind, and other renewable energy sources has already contributed to significant improvement in Michigan's air quality.

There are also opportunities in this Plan's recommendations for Michiganders to save money. For example, every \$1 invested in reducing energy waste in our homes – through weatherization, more efficient windows and lighting, and energy-saving technologies – will save homeowners more than \$3.30 in reduced future energy bills (see Buildings and Housing Workgroup recommendations – Appendix II). Likewise, expanding access to public transit in Michigan (see Transportation and Mobility Workgroup recommendations – Appendix II) will yield well-established reductions in commuting costs for Michigan families.

Putting equity front and center in Michigan's climate change response.

Our state's frontline communities – those that have been harmed the most from a carbon-based economy and left with the least individual and community resources to respond to extreme weather impacts and adapt to the economic transitions of decarbonization – are disproportionately bearing the burdens of climate change.

Heavily developed frontline urban neighborhoods often lack the infrastructure and greenspace to handle heavy rains, thus making them more susceptible to flooding that leaves them with backed up sewers and deluged basements. Limited forest cover in these communities makes intense heat spells even more dangerous and miserable. In every corner of the state – urban or rural – too many Michiganders live in substandard, poorly insulated housing with inadequate heating and cooling systems. Many also face utility shutoffs as they struggle to pay rising monthly bills. This puts them

at significant risk when temperatures hit either extreme. Without deliberate efforts to address these and other climate-related inequities, the existing divides in our Michigan family will only grow in coming decades.

For this reason, Governor Whitmer called on those developing the MI Healthy Climate Plan to design and recommend decarbonization strategies that will advance equity. Specifically, she directed EGLE and the Council on Climate Solutions (see more below) with “identifying solutions to resolve impact disparities across Michigan and recommending targeted solutions for communities disproportionately impacted by the changing climate.”

She also created the Climate Justice Brain Trust – a distinguished group of environmental justice (EJ) leaders in Michigan – to assist public officials in understanding and addressing the unique climate challenges facing low-income residents, people of color, and other overburdened communities. Members of the Brain Trust also helped illuminate strategies to ensure the benefits of the state’s clean energy transition will be equitably enjoyed by all Michiganders. EGLE staff have also engaged with the Michigan Advisory Council on Environmental Justice on this Plan and will host additional listening sessions focused on justice and equity issues moving forward. EGLE views these initial discussions as just the beginning of a sustained effort to better understand the impacts of climate change in EJ communities and design programs to address them. We also note that several local initiatives in this area are more advanced, such as Community Collaboration on Climate Change (C4) in West Michigan. EGLE looks forward to learning from these efforts and fostering connections across the state.

Additionally, Governor Whitmer launched the Energy Transition Impact Project (ETIP) to support communities that will experience job losses, declining tax revenues, reduced local services, and other impacts as aging coal-fired power plants in their cities close. ETIP will assist these communities in attracting new companies and training residents for the jobs of the future. As you will see below, ETIP will continue to play a central role in Michigan’s climate change response.

In the remainder of this Plan, specific strategies for advancing equity in all aspects of Michigan’s work to achieve carbon neutrality will be spelled out and emphasized in conjunction with related recommendations.

A Michigan climate plan shaped by Michigan residents

This Plan was developed by EGLE with input from hundreds of Michigan residents. To serve as the primary venue for gathering and channeling that input, Governor Whitmer created the Council on Climate Solutions in conjunction with committing Michigan to 100% decarbonization.

The Council consists of 14 Michigan residents appointed by the governor to represent a range of sectors, experiences, and expertise relevant to climate issues. Additionally, the Council includes the directors (or their designees) of EGLE and the Michigan Departments of Agriculture and Rural Development, Labor and Economic Opportunity, Natural Resources, Transportation, Health and Human Services, and Treasury, as well as the Chair of the Michigan Public Service Commission.

The Council met 14 times in 2021 to develop a common knowledge base on the climate challenge and discuss the content and recommendations laid out in this Plan and its appendices.

To dig deeper and tap broader expertise across Michigan in key areas, five topical workgroups were formed to support the Council:¹

- Energy Production, Transmission, Distribution and Storage
- Transportation and Mobility
- Buildings and Housing
- Energy Intensive Industries, and
- Natural Working Lands and Forest Products.

Membership in these come-one-come-all workgroups was open to the public. Each was co-chaired by a State of Michigan official and a private-sector resident with subject-matter expertise in the relevant field. These workgroups met periodically through much of 2021 and presented their recommendations to the full Council in the closing months of the year. Listening sessions were then conducted to receive public input on those recommendations (a complete set of which is provided in the appendices).

In addition, public comments were welcomed and received throughout the above-described process via the Council's email address. And EGLE has already begun receiving additional input from the EJ community, starting with members of the equity-focused Climate Justice Brain Trust and the Michigan Advisory Council on Environmental Justice.

Developed by Michiganders, this Plan builds from the progress our state has already made in decarbonizing our economy. It focuses on specific areas where Michigan has the biggest gaps to close and recognizes that the characteristics which make Michigan

special will shape how climate change affects our state and the tools we can deploy in response.

For example, if we protect and steward our globally unmatched freshwater resources, they will serve as perhaps our greatest asset in adapting to climate change. But the abundance of water in our state will also challenge us uniquely to address the kind of flooding and erosion we have experienced in recent years. Likewise, our heritage as a global manufacturing innovator, diverse agricultural producer, world-class outdoor recreation hub, and home to talented people and vibrant communities will also shape and support our Michigan-specific climate response.

Through implementation of the MI Healthy Climate Plan, the State of Michigan hopes to provide local governments, workers, entrepreneurs, businesses, and individual Michigan residents with a framework and inspiration to join in the efforts to create a more climate resilient, prosperous, and equitable Michigan. To those of you who have a head start on us, we look forward to catching up.

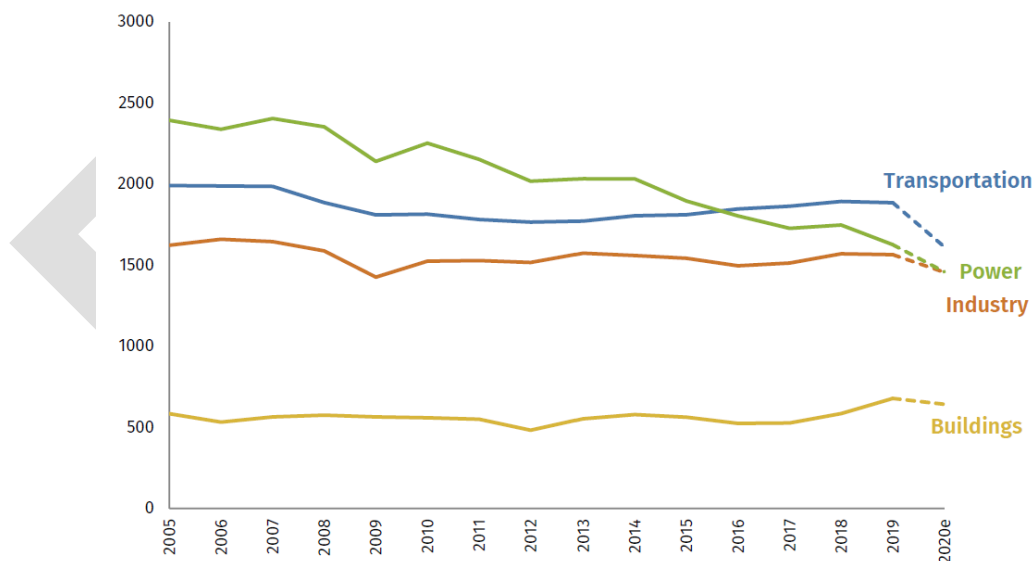
Key Focus Areas

The MI Healthy Climate Plan is focused on Michigan's most significant sources of GHG emissions and taking action where the biggest gains can be made.

The Plan strives to reduce GHG emissions from 2005 levels: 28% by 2025, 52% by 2030, achieve carbon neutrality by 2050, and maintain net negative GHG emissions thereafter. It seeks to do so in a manner that respects all Michigan residents, and it recognizes the changes ahead may impact different individuals, communities, and businesses in different ways. With that in mind, the Plan tries to maximize positive benefits and minimize potential negative impacts across the board.

As the figures below indicate, the transportation sector is currently the leading contributor to Michigan's GHG emissions followed by electricity generation, industry, and commercial and residential buildings. Reflecting that reality, this Plan focuses most heavily on the short-term (this decade) strategies Michigan can pursue to curb emissions in those sectors—because we cannot achieve our decarbonization goals without major changes now in those areas.

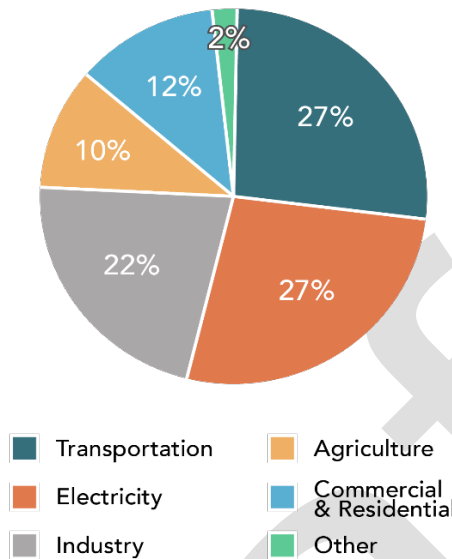
FIGURE 1
US GHG emissions by major emitting sector
Million metric tons CO₂e, IPCC definitions, excludes international bunkers



Source: ClimateDeck

Figure 1: Rhodium Group, Climate Deck

MICHIGAN GHGs BY SECTOR



Data source: EPA GHG Reporting Program, 2020

Figure 2: Michigan GHG Emissions by Sector 2020. Source: U.S. EPA

That does not mean concerted action in other sectors is not necessary. There are many vital GHG reduction strategies that are not included in the following key focus areas. Many were proposed in the process through which this Plan was developed and are included in the appendices. To the extent possible, the State of Michigan intends to work with partners to facilitate progress on many of those recommendations. Additionally, as the Innovation and Engagement sections of this Plan suggest, we do not know every road or turn that will lead Michigan down the most effective and equitable route to full carbon neutrality. Squeezing GHG emissions out of our daily activities as a state will take creativity, ingenuity, and commitment from all Michiganders.

Before summarizing the Plan's key focus areas, two final points deserve emphasis:

- The State of Michigan's work to pursue this Plan's goals in the coming decade must also include building a better understanding of Michigan's baseline GHG levels and improved systems for measuring/tracking emissions reductions.
- Addressing climate change will take concerted action at the international, federal, state, local, and individual levels (public- and private-sector alike). This

Plan attempts to capture state-level efforts which will be critical to putting Michigan on the right track to achieving necessary carbon reductions.

Summary of Key focus areas for 2022-2030

Overarching goal.

Meeting the 2050 goal will require a switch to 100% clean, renewable electricity paired with robust energy storage and applying the same level of ambition to other sources of GHG emissions. The best solutions to achieve these goals for all Michiganders are far from written-in-stone and will continue to evolve through innovations in technology, strategy, policy, and individual/community problem solving from now through 2050.

Energy Production.

- **Holistic statewide energy planning** – Implement a series of measures towards more holistic and integrated energy system planning in Michigan. This should include rate design, traditional resource planning, long-range transmission planning, distribution planning, storage planning, consideration of new and emerging resources, planning around areas of interdependency between the electric and natural gas systems, and consideration of community and health impacts.
- **Clean energy resources** – Adopt a renewable energy standard of 50% by 2030, either through legislation or formal commitments in proceedings before the MPSC. In addition, Michigan should commit to end its use of coal-fired power electricity production by no later than 2035.
- **State electricity use** – State-owned facilities will utilize 100% in-state renewable energy by 2025 and reduce energy intensity in state facilities 40% by 2040.
- **Siting** – Implement a plan to site solar on state-owned lands and properties to help deploy solar across the state as quickly as possible. Complement this work by assisting local units of government in adopting best practices for siting renewable energy systems within their communities.

Transportation.

- **Infrastructure** – Build the infrastructure to support 2 million electric vehicles on Michigan roads by 2030. This should include at least 50% of light-duty vehicle

sales, 30% of medium- and heavy-duty vehicles sales, and 100% of public transit vehicles and school buses sold that year.

- **Electric vehicle purchase incentive** – Create and fund an electric vehicles incentive program for the purchase of electric vehicles and charging stations.
- **Fleet transition** – Transition the State of Michigan’s fleet to 100% zero-emission vehicles by 2035 for light-duty vehicles and 2045 for medium- and heavy-duty vehicles. Coordinate relevant state agencies to plan for the building out of necessary electric vehicle infrastructure. The State should also develop and fund programs to support schools, local governments, small businesses, and NGOs with transitioning their fleets to electric vehicles.
- **Clean Fuels Standard** – Adopt a clean fuels standard to provide a range of low-carbon fuel alternatives, which reduce dependency and achieve air quality benefits.
- **Broaden transportation planning** – Develop an Electrification Strategic Plan to better understand how the Michigan Department of Transportation and other state agencies will need to operate in the future, including consideration of a statewide transit electrification plan to complement the work.
- **Transit and targeted solutions for mobility insecurity** – Invest in a cleaner, more efficient public transit system. Combine these efforts with micro mobility, “last mile” transit options, and bike and walking trails and infrastructure to offer the broadest range of options to residents. Consider how behavioral changes like the growth in remote working have changed people’s transportation habits and how to incorporate those new habits into future transportation planning.

Businesses and Homes.

- **Enhance energy waste reduction programs** – Adopt a 2% energy waste reduction target for electricity and 1% for natural gas. Explore additional pathways to reduce energy demand and energy burden.
- **Clean energy investments** – Explore programs, financing options, and public funding opportunities—including the allocation of funds to the state’s nonprofit green bank, Michigan Saves—to help families and small businesses invest in clean energy projects from weatherization to renewables to building decarbonization.
- **Building codes and climate readiness** – Adopt the 2021 Model Energy Code, include provisions to support electric vehicle charging, and consider incorporation of additional climate mitigating solutions such as energy storage, renewable energy, and building decarbonization.

Environmental Justice.

- **Justice40** – Ensure all state funding for climate-related programs and initiatives is designed to meet Justice40 guidelines and serve all Michigan residents.
- **Just transition support** – Enhance the ETIP program by seeding a fund to provide support to communities for addressing economic transition challenges related to decommissioning energy plants.
- **Job training** – Make Michigan a regional and national leader in clean energy jobs and incentivize clean energy businesses to invest in Michigan by augmenting existing workforce development, job training, and apprenticeship programs to include specific pathways for in-demand clean energy jobs (from pre-weatherization services to grid maintenance and renewables). Support business development and attraction around clean energy businesses with a focus on communities that are underrepresented in the industry.
- **Invest in better homes** – Explore ongoing funding options to address homes that are ineligible for weatherization assistance due to structural and other challenges and assist families struggling to address impacts to their homes from climate-related storm events.

Leadership and Innovation.

- **Clean industry** – Encourage the development of clean industrial hubs, and support research and development focused on reducing GHG emissions in key industries.
- **Recycling and recycled materials** – Triple the state's recycling rate to 45% by 2030 and strengthen public and private-sector procurement programs to favor the use of low-carbon and circular-economy products.
- **Land and water protection** – Implement a plan to protect 30% of Michigan's land and water by 2030.

Discussion of Key Focus Areas

As mentioned above, energy production, transportation, and buildings and homes are areas where Michigan needs the most aggressive GHG reductions to meet this Plan's short- and long-term goals. The following provides additional background for our state's work in those sectors.

NOTE: This section borrows liberally from the concepts and language that the five topical workgroups submitted to the Council on Climate Solutions along with their recommendations. The workgroups included: Energy Production, Transmission, Distribution, and Storage, Transportation and Mobility, Buildings and Housing, Energy Intensive Industries, and Natural Working Lands and Forest Products.

Energy Production: Accelerating Michigan's transition to a clean energy future.

The power sector currently accounts for 27% of Michigan's GHG emissions (second only to the transportation sector). As Figure 1 in the Key Focus Areas section shows, the power sector has made the most significant GHG reductions since 2005 on the national level – cutting its overall GHG emissions by 14.4% in that period.

While that progress is worth celebrating, we estimate that Michigan must drive reductions in the carbon intensity of our power sector to 80% by 2030 relative to 2005 levels, if we are to achieve our medium-term target of 50% decarbonization by the end of this decade. And by 2050, our goal is to achieve 100% clean, renewable electricity paired with robust energy storage.

Michigan has been moving in the right direction on clean energy and carbon reduction. Complemented by expansions and innovations in areas like energy storage, which involves saving electricity for use when it is needed, the two pillars of clean energy are:

- Renewable power generation from sources such as solar and wind. Sharply ramping up the share of our electric power that comes from renewable sources will be pivotal because electrification will play a central role in

decarbonizing our transportation and building sectors. Our overall success in achieving this Plan's goals thus hinges to a significant extent on how much and at what speed we can add renewable power we can add to our electrical grid.

- Energy waste reduction strategies such as improving insulation, installing energy-saving lighting, and investing in more efficient factory equipment. Making the most of energy waste reduction opportunities throughout the state is the fastest and surest way to make progress in reducing Michigan's GHG footprint. When it comes to reducing harmful emissions—and saving money for Michigan families and businesses—it's hard to get more bang for the buck than cutting energy use.

In 2008, the State Legislature passed Michigan's first clean energy legislation. It required utilities to generate 10% of Michigan's energy via renewable sources by 2015 and dedicate funds to helping their customers reduce their use of electricity (or cut their energy waste). Amendments to those laws adopted in 2016 increased Michigan's commitment to renewable energy to 15% by 2021.

With these state policies providing an impetus, Michigan is on track to have 3,354 megawatts of renewable energy capacity by the end of 2022. Since 2017, the weighted cost of renewable energy from these newer projects has been \$55 per megawatt hour, \$10-\$25 per megawatt *less* than major energy providers would pay otherwise for non-renewable resources.

In addition to the role that state policy levers have played, nearly all of Michigan's electric utilities have made individual commitments to reduce carbon emissions, with some utilities pursuing levels of renewable energy deployment beyond what is required under the state's existing mandates and goals (see Figure 3).¹ They are also retiring their fleets of aging coal-fired plants which once generated most of Michigan's electricity. According to utility retirement schedules just one coal-fired power plant is scheduled to continue operating after 2028.

Advancing Equity and Job Opportunities

Michigan's clean energy industry currently boasts just under 110,000 jobs, and total employment in the sector is projected to increase by 2% annually between 2018 and 2028.

As our energy sector completes its ongoing shift from centralized power plants to more distributed clean solutions, Michigan must take forward action to ensure this transition is just—that Michiganders who need economic opportunities have access to jobs in our growing clean energy sector, that those jobs pay well and provide good benefits, and that communities which have powered our state for decades are not left behind.

Building from our state's wealth of talent—with the highest concentration of engineers in the nation and a skilled trades workforce ranked in the top ten[1]—Michigan's *just transition* will require major investments in clean energy workforce development and job training opportunities with a focus on communities that already have been disproportionately impacted by climate change. Through programs like Governor Whitmer's Energy Transition Impact Project (ETIP), our state must also assist communities facing coal plant closures in attracting new employers and preparing residents for the jobs of the future.

Additionally, as the state's electric utilities work to ensure grid reliability through major changes in power generation and distribution, Michigan must ensure they fully engage and serve customers with a focus on communities facing the greatest burdens of climate change.

According to the Michigan Public Service Commission, “the electric industry is on the cusp of transformational change” and “supplies used to power Michigan homes and businesses are shifting from large central-station power plants to cleaner and more distributed energy resources.”²

MI Electric Utility Carbon Goals

	2030	2040	2050
DTE	50%	80%	100%
Consumers		100%	
UPPCo	17%*		
I&M	60%		80%
NSP	80%		100%
UMERC	40%		80%

*UPPCo intends to meet this goal by 2021

Source: Michigan Public Service Commission 2019 Annual Report

Planning and the MPSC’s central role in regulatory oversight of energy in Michigan will be key in achieving targets. The Michigan Public Service Commission (MPSC) is an independent state agency that regulates the state’s electric utilities³ to ensure adequate energy supply and approve rates and conditions of service. Its mission is: “to serve the public by ensuring safe, reliable, and accessible energy and telecommunications services at reasonable rates.”⁴ A central component of that role is approving the costs or investments that Michigan’s regulated utilities can recoup from their customers via the amounts charged on their monthly utility bills. The MPSC also implements energy laws passed by the Michigan legislature, such as the state’s current renewable energy standard and energy waste reduction requirements described above.

In addition to expanding the renewable energy standard, the energy laws Michigan adopted in 2016 strengthened the MPSC’s oversight of future utility spending by requiring rate-regulated electric utilities to submit integrated resource plans or IRPs. An IRP is an electric utility’s long-term plan for fulfilling its obligation to meet the future energy needs of its customers in the most “reasonable and prudent” manner possible. Topics included in utility IRPs – and considered in the MPSC’s review and approval of them – have included whether a utility will be authorized to pass the costs of building new power plants onto customers and the timeline for closing coal-fired power plants. Importantly, what is viewed by regulators as “reasonable and prudent” includes consideration of GHG emissions reductions.

Under Executive Directive 2020-10, Governor Whitmer also directed EGLE to elevate decarbonization in the IRP process run by MPSC. Under that directive, EGLE must file

an environmental advisory opinion with the MPSC that evaluates “the potential impacts of proposed energy generation resources and alternatives to those resources, and also evaluate whether the IRPs filed by the utilities are consistent with the emission reduction goals included in this Directive.”⁵

The state’s current IRP process has played an important role in moving our electric utilities toward greater use of energy efficiency, renewable energy, and other clean, flexible energy resources. As Michigan works to achieve even deeper energy sector decarbonization in the decade to come, this process will play a central role in Michigan’s major power generators hitting even more ambitious clean energy and decarbonization benchmarks – both those outlined in voluntary commitments and those required by law.

Importantly, this Plan calls on the MPSC to engage in broader system-wide energy planning for Michigan as a whole. As we transition from reliance on large, centralized generating plants to more distributed or decentralized renewables and complementary technologies like battery storage, the kind of planning this Plan recommends will ensure all of our state’s energy assets are networked, coordinated, and integrated so we maintain reliability and advance affordability as we transition to clean energy.

Renewable energy is reliable and cost effective. As deployment has increased and the wind, solar, and related industries have scaled up, the cost of renewable energy has continued to fall. From 2009 to 2020, it cost energy providers an average of \$64.48 per megawatt hour to purchase renewable energy. However, if you look at the contracts approved since 2017, that number drops to \$55.46, with more recent reported contracts coming in as low as \$41.72 for solar. As mentioned above, those costs are significantly less than major energy providers would pay otherwise for non-renewable resources.

While the transition away from centralized, fossil-fuel power plants undoubtedly represents a major change for utilities in how they deploy their resources

Increasing Economic Competitiveness

Michigan’s transition to clean energy can provide a major boost our economy.

According to research from the Site Selectors Guild Cleaner, clean energy and sustainability are among the top trending factors in corporate location decisions, particularly among consumer-facing and public companies.^[1] Michigan was recently recognized as a leader in this regard: “The state’s commitment to green energy practices and social responsibility has been affirmed by Site Selection’s 2021 Sustainability Rankings. Michigan was ranked by the magazine as the No. 3 state for sustainable development, and Grand Rapids and Lansing were ranked the nation’s No. 2 and No. 6 metros.”^[1]

Complementing our world-class workforce, *Pure Michigan* quality of life, affordable cost of living, and competitive business climate,^[1] implementing the *MI Health Climate Plan* can help Michigan attract job-creating business investments by offering sustainability-minded companies the opportunity to power their operations with clean energy.

to meet customer demand, a network of renewable energy facilities distributed around the state can offer numerous advantages for grid reliability and resilience. Additionally, while some renewable energy resources are intermittent, they are nonetheless predictable. That predictability allows grid managers to balance renewable energy with other generation facilities and storage capacity.

Distributed, renewable energy is also offering Michigan residents opportunities to play a bigger part in accelerating progress toward our shared decarbonization goals. Customer-sited solar is already taking off in Michigan. Digital innovation has enabled consumers to monitor and manage their energy use in real-time, just as grid operators are embracing the use of advanced metering infrastructure and cutting-edge distributed energy resource management systems. Improved energy storage promises to complement and add flexibility to these tools. With the help of customer incentives, these developments will pave the way for greater adoption of time varying prices that drive more efficient use of electricity. In the process, Michiganders can save money by shifting their power use to when electricity is cheapest.

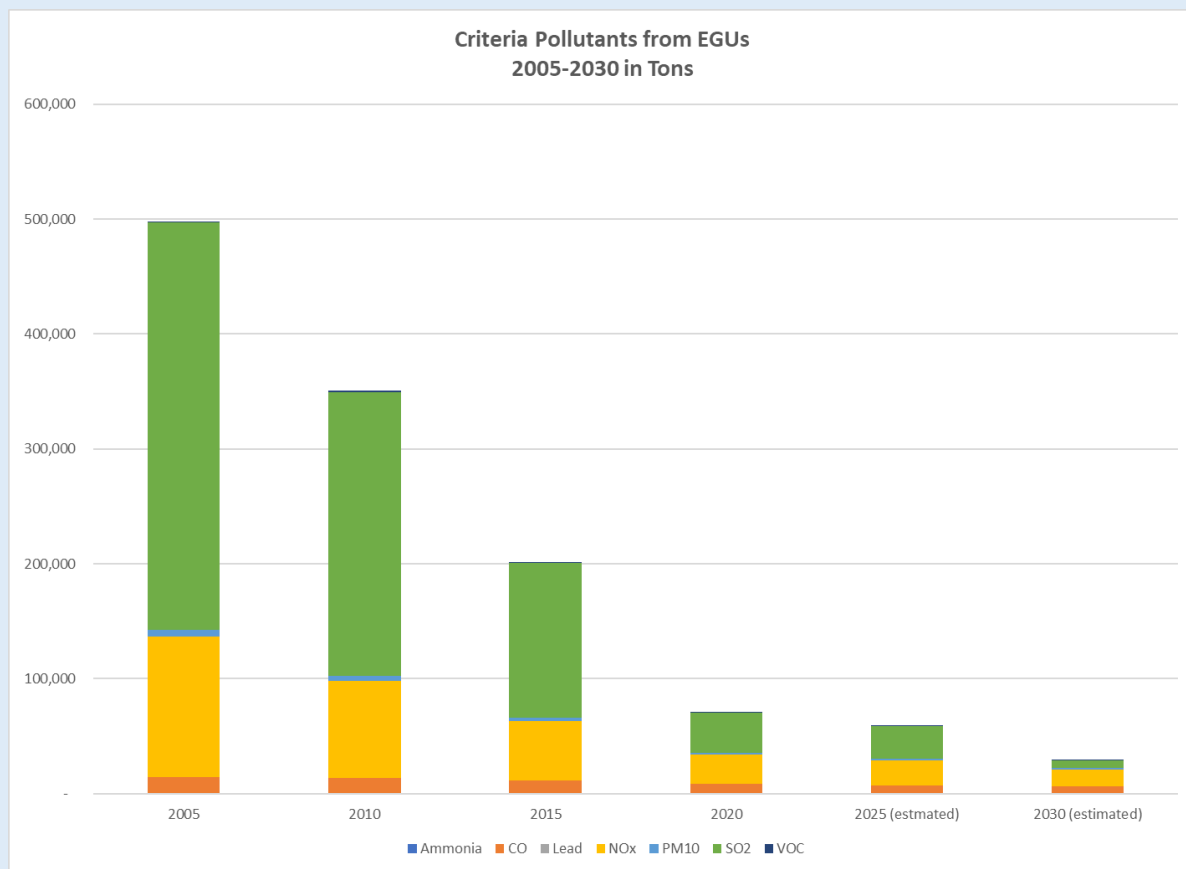
Improving our health and quality of life.

Transitioning to clean energy will dramatically improve public health.

Since 2005, air pollution from power plants in Michigan has dropped 85% as we have transitioned away from coal to cleaner power sources. By 2030, as more coal-fired power plants close, Michigan is projected to experience a 94% reduction in air pollution from power plants relative to 2005 levels. With power plants accounting for two-thirds of all air pollution coming out of smokestacks in 2005, our clean energy transition has driven significant improvements in the quality of the air we breathe.

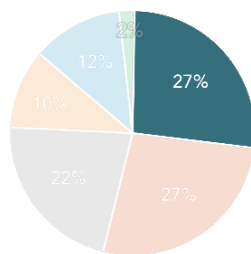
This translates into major health benefits for Michigan residents. For example, numerous scientific studies have linked exposures to particle pollution—of which power plants are a major source—to premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms, such as coughing or difficulty breathing. As we embarked on our transition to clean energy, particulate matter pollution from Michigan power plants dropped by 73% between 2005 and 2020.

The table below shows the dramatic reduction from 2005 to 2030 in emissions of key air pollutants from energy generation (energy generating units or EGUs).



[Health and Environmental Effects of Particulate Matter \(PM\) | US EPA](#)

Transportation: Putting Michigan on the road and rails to carbon-neutral mobility.



TRANSPORTATION

As of 2018, Michigan's transportation sector accounted for almost 28% of the state's total GHG emissions, officially surpassing the electricity sector as our state's leading source. The gap between those two sectors has likely grown in the three years since,

given the additional known reductions in emissions from power generation.¹ Transportation emissions are primarily due to the combustion of petroleum products such as gasoline and diesel, with biofuels, propane, natural gas, and electricity making up the rest.²

Similar to the electricity sector – in which our state is already transitioning from fossil-fuels to renewable sources – the work to decarbonize transportation in Michigan will occur in the context of monumental change that is already in motion.

Automobile manufacturers across the board have announced their intent to phase out internal combustion engines and replace them with cleaner more efficient electric motors. In January 2021, General Motors announced a goal of selling only zero-emission cars and trucks by 2035.³ In May 2021, Ford announced it will spend more than \$30 billion on EVs, including batteries, over the course of this decade (up from its prior target of \$22 billion).⁴ And in January 2022, Stellantis announced its intention to convert its Chrysler brand to all EVs by 2028.

As Michigan's Council on Future Mobility and Electrification observed: "Over the next decade vehicle electrification will...become the dominant propulsion system on the market, advanced automated vehicle technologies and smarter infrastructure will become a more common part of the mobility experience, and the most valuable part of a new vehicle will change from hardware to software. Likewise, workforce demands will grow and shift, as will other inputs for the manufacturing process, and the need for high-tech talent will exceed what current development pipelines can produce."⁵

This transformation will also include making our trains, buses, vans, and other public transit options cleaner – by electrifying these fleets alongside personal vehicles.

While pointing to the equity, job creation, economic competitiveness, and other quality-of-life opportunities Michigan can seize by acting now, the following offers vital context for understanding this Plan's transportation recommendations.

Navigating a pivotal decade of transition in automotive history

As part of their plans to replace existing models with EVs, Michigan automakers – independently and in partnership with technology companies and investors – are already planning to build or transform manufacturing facilities in our state, thus creating and retaining thousands of jobs for Michigan workers.⁶ However, while our state has a range of competitive advantages that come with a century of global automotive leadership, we will need to be innovative and aggressive to attract investments – from longstanding and emerging players – as the sector retools.

In that process, we must prepare our workforce for shifting jobs and opportunities. As noted above, software, operating systems, and batteries will play central roles in the vehicles of the future, while some existing links in the auto supply chain will become obsolete. Fewer parts and workers may be needed to manufacture vehicle components and assemble EVs, which are also expected to require less aftermarket service and

parts than internal combustion engine vehicles. This may lead to per unit jobs losses relative to traditional cars and trucks. Michigan needs to be ready.

At the same time, the development and maintenance of the statewide public and private charging infrastructure needed to fully support EV use may stimulate the state's economy and boost job growth. And the economic development ripple effects of wise and expanded investments in public transportation can mean opportunities for entrepreneurs, small businesses, and workers in Michigan communities.

As the Council on Climate Solution's Transportation and Mobility Workgroup emphasized in its work, Michigan will need to plan strategically and act decisively to achieve successful and equitable outcomes in this transition to electrification – with clear goals and approaches for sequencing and integrating the work that must be done.”⁷

Taking a broad, all-options approach to transportation to put Michigan on track to achieve its decarbonization goals

As the workgroup also emphasized, experts agree that electrification is the key technology needed to meet 2050 decarbonization goals for the transportation sector, but it cannot get Michigan to its targets on its own.

Rooted in the slow turn-over rate of our vehicle fleet, the vast majority of vehicles on Michigan's roads will still be burning gasoline in 2030, even if we adopt the market incentives recommended in this Plan and automakers aggressively pursue their EV sales goals. In light of this reality, Michigan needs to employ multiple strategies to achieve our transportation decarbonization goals as the transition to electrification unfolds over time.

Expanding access to safe and convenient public transit and biking options will play a vital role in this regard, especially since those options are a cornerstone of advancing equity. Prior to COVID, about 4 out of every 5 workers in Michigan used their vehicle to commute to work. However, almost 10% of Michigan households have no vehicle at all, and that number almost doubles to 19% for renters. Public transportation is also critical to meet the transportation needs of seniors and those with disabilities. Providing a foundation to build from, overall transit funding in Michigan is now \$200 million per year – an average annual increase of \$47 million from previous investment levels.

Complementing buses, trains, and bike paths/lanes as alternatives to personal vehicle use, car sharing is another tool Michigan can deploy to accelerate decarbonization. While various models exist, car sharing is generally a membership-based service that provides subscribers access to an insured vehicle that they do not have to purchase and maintain on their own.”⁸ While there is more to learn about the best role it can play in our overall transportation system and the contribution it can make to reducing GHG emissions, states like Minnesota and New York are experimenting with car share investments that will increase access to electric vehicles use for low-income residents and expand charging infrastructure in disadvantaged communities. Michigan should

consider such models to boost demand and help close the electric vehicle equity gap.

A Clean Fuels Standard can also serve as a powerful lever in ratcheting down carbon emissions in the transportation sector as the shift to electrification occurs over time. Established by state policy change, a Clean Fuels Standard would set a standard for the private sector to meet in reducing the carbon intensity of every fuel in use, thus leading to positive environmental benefits for every vehicle on the road. By setting a standard that grows more stringent over time, the program could dramatically increase private investment in lower carbon fuels.

By adopting a Clean Fuels Standard that positions Michigan as a national leader in the sector, Michigan could also spur innovation and incubate job-creating markets in our state. According to a model produced by ICF for the Midwestern Clean Fuels Policy Initiative, a Clean Fuels Standard that reduces the carbon intensity of fuels by 15% this decade would create nearly 15,000 jobs and \$946 million in employment income. It would also increase the regional gross domestic product by \$1.98 billion and provide net benefits to gasoline car drives, the trucking sector, and others.⁹

State-level policies and programs across the country provide a bank of options and experiences for a Michigan-specific approach.

When the Transportation and Mobility Workgroup submitted its recommendations to the Council on Climate Solutions in fall 2021, 47 states and the District of Columbia were already offering incentives to support deployment of electric vehicles or alternative fuel vehicles and supporting related infrastructure, either through state legislation or private utility incentives. Eight states have electric vehicle purchase incentives of \$2000 or more.

In addition to measures like providing high-occupancy vehicle (HOV) lane exemptions and establishing lead-by-example initiatives like zero-emission vehicle (ZEV) requirements for government fleets, several states have adopted tax credits, rebates, and registration fee reductions to promote EV purchases. For example, Illinois offers a \$1,000 tax credit on the purchase of light-duty electric vehicles, and Connecticut allows for a reduced biennial vehicle registration fee of \$38 for electric vehicles.¹⁰ Utilities also offer incentives, rebates, and grants for transportation electrification. One of the most common incentives is price reductions for charging electric vehicles during off-peak hours. Other utilities incentivize the purchasing of electric vehicles and equipment through rebates.¹¹

While adopting the policies of other states in a cookie cutter fashion is unlikely to serve our needs and goals effectively, Michigan should learn from the solutions others are implementing, borrow those likely to work here, and tailor them to our unique needs and circumstances.

Strategic transportation planning will help knit traditional and advanced transportation options into an integrated system that serves all Michiganders

As with the energy sector, sophisticated statewide planning will also play a central role. Our focus needs to go beyond simply changing what powers our vehicles, to gaining a better understanding of how transportation and our mobility options will continue to evolve with technology and fit together in an integrated system. Important questions will include: How will the growth in remote working and riding sharing opportunities change transportation habits? How can new technologies be efficiently combined with public transit, bike lanes, and pedestrian pathways to offer the broadest range of transportation options to residents?

Forward looking and strategic planning can help Michigan meet our transportation decarbonization goals in ways that advance equity, expand employment opportunities for Michigan workers, rejuvenate our urban areas, and attract new companies and talent to our state.¹²

Advancing equity and job opportunities

The transition to increased electrification in the transportation sector presents a variety of attractive economic development opportunities across Michigan. Through this transition, the state must guard against potential job losses and dislocation by capturing as high a percentage of the new jobs in the advanced mobility space as possible.

Similar to programs like ETIP for coal-fired power plant closures, state strategies to reduce GHG emissions should include support for such communities in attracting new employers and training residents for future jobs. The same goes for any job losses associated with the fewer person-power hours that may be needed in electric vehicle manufacturing and aftermarket services.

From purchase incentives to car sharing programs, we need to find ways to make electric vehicles as affordable as possible, while also significantly improving public transportation options for Michiganders who choose not to own a vehicle or are priced out of the market for a personal vehicle and lack reasonable access to jobs and other opportunities as a result. Similar to the energy burden as it applies to utility bills, Michigan should pursue carbon neutrality with eye to reducing low-income “transportation burden” by considering combined housing and commuting costs when implementing this Plan.

Increasing economic competitiveness

Michigan's heritage as a global automotive powerhouse equips with our state numerous advantages in retaining and attracting investments in advanced mobility manufacturing and the related supply chain – from our wealth of engineers and skilled workers to our supportive public and private universities and existing manufacturing infrastructure including the full suite of industry support services. Combined with our many quality of life assets and supported by ramping up our clean energy, there are opportunities for Michigan to seize in the emerging transformation to electrified transportation. Some Michigan leaders are also working to capitalize our state's great outdoors and water resources to position our state as the hub for the electrification of water crafts and other recreational vehicles.

Talent attraction and community development opportunities also accompany wise investments in public transportation. Studies have shown that young professionals favor locations with rich transit, biking, and walking options when choosing where to live, and establishing transit hubs can spur rippling investment in—and prosperity for—surround commercial enterprises (to be supported with facts/figures and cited). Adopting a Clean Fuels Standards can also create new market development opportunities.

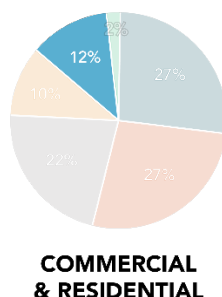
Improving our health and quality of life

The transportation sector is a major source of air pollution in the United States. Auto emission standards have and will continue to reduce those emissions from internal combustion engines. However, the electrification of our transportation sector provides an opportunity to accelerate those reductions. As Michigan residents transition to electric vehicles, we can expect to see improvements to air quality and a decline in related health problems.

Scientists are also studying the drop in noise pollution related to the use of electric vehicles and its connection to reducing stress in heavily congested areas including urban settings.

Improvements to public transit and increased available and walking and biking opportunities both reduces harmful emissions and gives residents better opportunities for exercise and enjoying Michigan's natural beauty.

Businesses and Homes: Reducing energy demand and waste in Michigan homes, commercial buildings, and factories.



Roads and bridges, as well as drinking water, stormwater, wastewater, and other critical systems, are what most immediately enter our minds when we think *infrastructure*. When it comes to climate change, preparing those systems to withstand and manage increasingly frequent rainstorms and floods – and other impacts – will be critical to Michigan’s quality-of-life and bottom line in the coming decades.¹ Studies forecast that climate-induced extreme precipitation and flooding may cause Midwest states like Michigan as much as \$6 billion annually in severe damage to roads and bridges in coming decades.² As Michigan makes the historic investments in infrastructure we are planning for now, we need to design systems to meet the challenges of more frequent extreme weather and support communities lacking the resources to respond effectively.

While we think less often of Michigan’s housing and building stock as infrastructure, it too serves as a critical longstanding asset in our communities that requires ongoing investment and plays a central role in our physical, financial, and emotional well-being. Housing infrastructure is a major contributor to Michigan’s GHG emissions. As summarized by the Council on Climate Solution’s Buildings and Housing Workgroup: “As of 2018, Michigan’s residential and commercial buildings accounted for 19.8% of the state’s total energy-related direct carbon dioxide emissions...primarily due to natural gas combustion for space and water heating.”

To achieve our decarbonization goals, Michigan homes and buildings must use less energy and rely increasingly on clean energy sources for the energy that they do use. As we direct time, energy, and money on an almost unprecedented scales to upgrading our roads, bridges, powerlines, and pipes – and do so in ways that will help Michigan communities mitigate carbon emissions and prepare for climate change – we cannot set aside or delay the investments we need to make in our buildings and homes.

In pursuing this Plan’s recommendations and shaping our strategies in this area, we need to keep the following in mind.

Michigan needs to invest in upgrading existing homes and buildings

Half of Michigan homes are less than 50 years old. With adequate care and maintenance, most will remain in use through and beyond 2050 – our timeframe for achieving 100% economywide carbon neutrality. While the other half of Michigan homes are more than 50 years old, most can be expected to last another 50 years or more with modest investments. While this Plan recommends modernizing building codes for new construction, it recognizes that our existing stock of buildings and homes will turn over very slowly – much slower even than our car and truck fleets. To make the dramatic carbon reductions we need in this sector, we must focus on what we already have.

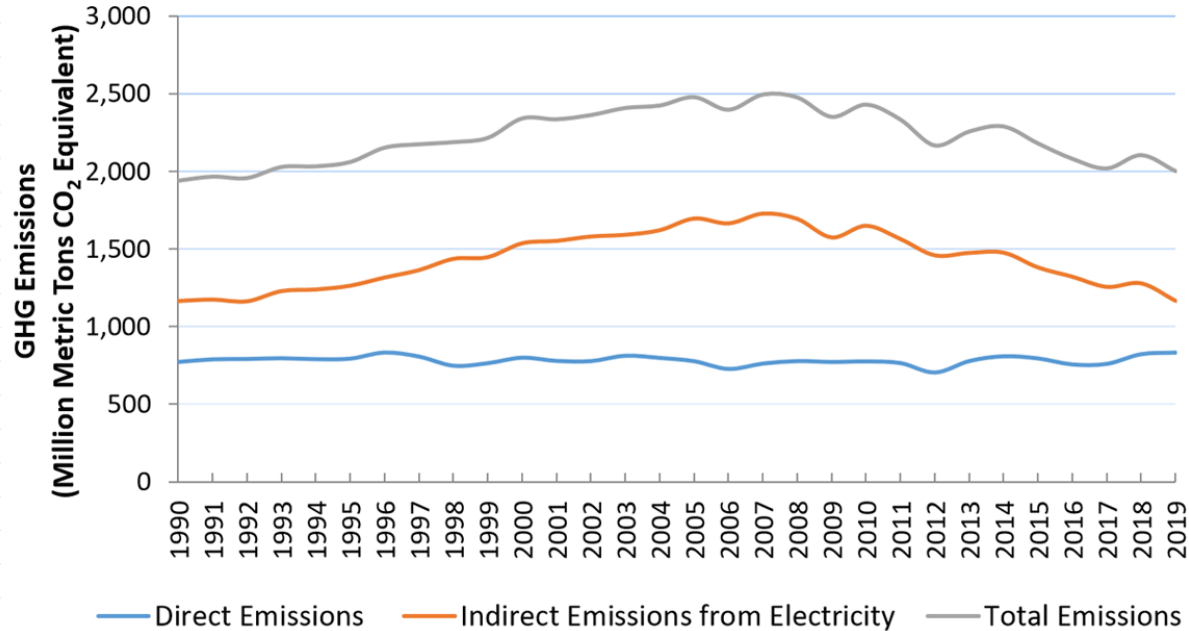
When we rehabilitate an existing home or commercial space, we reduce GHG emissions and support decarbonization not only by lowering a building's future energy needs but also by extending the useful life of all the materials used in its construction. As described further below, upgrades to the core building, such as improving electrical service, insulation, and ventilation, can reduce utility costs (and improve comfort and indoor air quality). Renovations can also be done with an eye to adding renewable energy to the property either immediately or over time.³

As we invest in our buildings, we must tailor our approach to the specific characteristics of Michigan's commercial and residential stock. According to Dr. Richelle Winkler, Professor of Sociology and Demography, Social Sciences at Michigan Tech University, key characteristics include: 1) size and materials; 2) year built; 3) housing type (single family, multifamily, mobile, etc.); and 4) housing tenure (the length of time the current occupant has lived in the residence).

Seventy-one percent of Michigan's housing stock is occupied by homeowners. While 82% of residents aged 65 and over are homeowners, more than half of residents 35 years old and under are renters. When you compare homeowners to renters – and single family/mobile homes to apartments – energy consumption approximately doubles.^{4 5} As we work to implement the recommendations in this Plan, we need to account for these and similar realities and allow them to shape our approach. We must also recognize that we will face unique challenges and opportunities in this work as we move across the state from urban centers to suburbs, exurbs, and rural areas. The nature of investments will also vary based on our buildings' heating sources which are diverse in our state.

And most importantly, we must address energy burden in this work. Families struggling to cover their current month's utility bill cannot contemplate larger energy saving investments that pay off over time – unless they have significant support. There will be different needs and plans for different people and places.⁶

Greenhouse Gas Emissions from Homes and Businesses, 1990-2019



U.S. Environmental Protection Agency (2021). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2019

Proven energy waste reduction programs can save Michiganders millions while driving decarbonization

In 2008, when Michigan passed the energy policy reforms described in the energy production section of this Plan, the state adopted a requirement for energy providers to encourage customer energy waste reduction. As originally written and later amended, those reforms set minimum requirements. Electric providers must achieve annual energy savings reductions of 1% per year (based on total annual retail sales of the prior 12 months) and gas providers must hit 0.75%. In addition, the laws established financial incentives for energy providers to meet or exceed those standards.⁷

Over the past decade plus, these reforms have made a significant positive difference. According to the Michigan Public Service Commission's Annual Report on the Implementation of PA 295 2019 Utility Energy Waste Reduction (EWR) programs:

EWR programs across the state accounted for annual electric savings totaling 1.47 million MWh, and natural gas savings totaling 5.37 million Mcf. Energy waste reduction expenditures of \$347 million equate to a lifetime savings benefit of \$1.180 billion for electric and gas customers. In 2019, electric EWR programs and measures had an average measure life of 13.97 years, equating to a realized lifetime savings of 20,438,906 MWh for those programs and measures. The average measure life of gas programs and measures was 14.52 years.⁸

The report also noted that customers are expected to realize lifecycle benefits of \$3.30 for every \$1 invested in reducing their energy use.⁹ Reducing energy use also remains significantly cheaper than generating new energy, further cementing energy waste reduction as the most effective and affordable tool in transitioning to clean energy. Reflecting these realities, this Plan calls for a significant strengthening of our existing EWR programs, doubling the energy waste reduction target for electricity to 2% and bumping it up to 1% for natural gas.

This Plan also calls on Michigan to strengthen existing models and create new mechanisms for providing Michiganders of all income levels – renters, homeowners, and business owners alike – access to the capital they need to reduce their energy burden and join carbon reduction efforts. To maximize our use of available resources, we must better coordinate state government and utility programs in this area. To rehabilitate as many Michigan homes and businesses as possible, we must find ways to wisely address current barriers such as the fact that many homes eligible for weatherization programs fail to receive services due to structural problems like a roof that needs repair.

Reducing GHG emissions in how we operate buildings – like cars, trucks, and other vehicles – will depend on our success in transitioning to clean energy.

While waste reduction is vital, we will always need energy to heat and power our homes – particularly in a climate like ours. It is worth noting that the figures cited in this Plan for GHG emissions of residential and commercial buildings exclude emissions from electricity produced to serve those buildings. To fully account for the role our building and housing infrastructure plays in achieving decarbonization targets, we need to follow distribution and transmission lines back to the power source. As the Council's Buildings and Housing Workgroup put it: "Achieving net zero greenhouse gas emissions in residential and commercial buildings will require both increased energy efficiency and the use of fuels (including electricity) that emit no lifecycle greenhouse gas emissions."¹⁰

As we transition to a clean energy future as described earlier in this Plan, we need to prepare our buildings and homes to plug seamlessly into our emerging, distributed, networked system.

Local units of government are leading the way in reducing their energy use and they need support for transformative water infrastructure projects

According to the Michigan Local Energy Survey (MiLES): "70% of local leaders from jurisdictions large and small report having at least considered plans or policies to address energy issues, and over half of Michigan local governments (54%) have implemented at least some plans or policies regarding energy issues."¹¹

In another survey conducted by University of Michigan, “more than half of local government officials in Michigan see improving energy efficiency for local businesses or residents as somewhat or very relevant to their jurisdiction’s government”¹² and “Approximately four in 10 Michigan local governments have had energy audits conducted for at least one type of government facility.”¹³

In addition to this broad interest and widespread action on energy waste reduction at the local level, some Michigan communities have developed creative action plans and implemented innovative solutions that make them national clean energy leaders. As we put this state-level Plan into action, those communities will serve as powerful engines of change – providing inspiration and models to emulate at both the state level and in cities, towns, and villages across our two peninsulas.

Additionally, as Michigan communities drive decarbonization and prepare for the impacts of climate change, water infrastructure will be key.

Drinking water and wastewater systems, which are estimated to account for as much as 4% of energy use nationally, are the largest energy cost center for many communities. In fact, energy can account for over half the cost of operating a municipal water system. Leaks throughout the system from the plant to the faucet – particularly in older systems – represent wasted energy, water, and money.

Michigan is surrounded by 21% of the world’s fresh surface water. But the infrastructure designed to get that water to our homes and businesses is crumbling. After decades of disinvestment in clean water, the state faces a long list of challenges – including lead service lines, sewers that cannot meet the challenge of larger storms, and failing septic systems. Analyses have shown that Michigan’s annual investment gap to fully upgrade our water and sewer infrastructure systems is \$800 million (that is the amount we need to increase our investment per year to catch up and maintain our systems).¹⁴

As described in Governor Whitmer’s MI Clean Water Plan, making investments on the scale needed – in this historic moment for infrastructure funding – will “support communities in every corner of Michigan in creating jobs, improving public health, and protecting Michigan’s drinking water and Great Lakes. With the EPA estimating that every \$1 million invested in water infrastructure creates 15 jobs...these infrastructure investments will support communities and workers across the state while they work to recover from the ongoing economic crisis.”¹⁵

With an eye toward decarbonization, we must also ensure these investments drive down the energy use at municipal facilities and save ratepayers money.

Advancing equity and job opportunities

The United for ALICE project (a project of the United Way) documents the struggle experienced by the Asset Limited, Income Constrained, Employed segment of our population. It shows that even with unemployment at record low levels, much of our population struggles to make ends meet. In Michigan as a whole, 38% of the population falls into this category with 13% below the poverty line and 25% above it but still not making ends meet. More than half of Michiganders across much of the Upper Peninsula and central portion of the Northern Lower Peninsula fall into this category. In Detroit, the figure is approximately 70%.

These families are faced with daily “choices” between paying rent, staying current on utility bills, and buying food for their children. As Michigan makes massive investments in its housing infrastructure to decarbonize our homes and buildings, our state should elevate programs that take maximum advantage of the powerful cost savings of energy waste reduction strategies to decrease the energy burden for low-income residents. This will include overcoming existing barriers to accessing weatherization programs and making more capital available for initiatives that serve overburdened residents.

At the same time, jobs related to improving energy efficiency (or energy waste reduction) represent the largest segment of the clean energy economy in Michigan. Recognizing this, workforce development programs should be designed and targeted to ensure Michiganders who need job opportunities are trained, hired, and justly compensated to do the work needed to improve the quality of our buildings and homes and dramatically reduce their GHG emissions. Investments to help low-income families remain in and rehabilitate their homes will strengthen communities and benefit everyone who lives there.



Increasing economic competitiveness

The Plan calls for increasing energy waste reduction requirements for both electricity and natural gas. In 2019, energy providers spent approximately \$347 million to meet these benchmarks and generated a lifetime savings benefit of \$1.180 billion for their electric and gas customers—more than \$3 save for every \$1 spent. Ramping up these programs will provide more opportunities for companies doing this work and benefit the bottom lines of businesses (and families) who participate.

Michigan's largest sector of clean energy jobs is in energy efficiency. The state is already home to over 50,000 jobs related to helping people make their businesses and homes more efficient. These jobs are often local and cannot be outsourced. As the reduction of carbon emissions grows in importance to Michigan companies and the customers they serve, this sector is poised for continued growth.

A concerted effort on building decarbonization will foster new economic opportunities and markets for Michigan. This is especially true where Michigan has a competitive advantage due to our abundant natural resources. For example, the state has launched a mass timber initiative focused on increasing the number of mass timber buildings across the state to reduce the carbon footprint of Michigan's building's materials and identifying resources to accelerate the mass timber sector, supply chain, and associated jobs in Michigan.

Improving our health and quality of life

A 2020 report by the American Council for an Energy-Efficient Economy (ACEEE) found existing in-home energy efficiency programs could be modified to promote improved health outcomes for participants. Specifically, the report found that by targeting four common health risks – asthma, falls, and exposure to extreme heat or cold – existing weatherization programs could save almost \$3 billion dollars in avoided health harms over a ten-year period. We also know these investments can enhance the comfort of our homes. And they can also be efficiently combined with other strategies like lead abatement and/or removal of lead plumbing and service lines to improve the well-being of families and the performance/value of their homes. ([Making Health Count: Monetizing the Health Benefits of In-Home Services Delivered by Energy Efficiency Programs | ACEEE](#))

Innovation: Areas and opportunities of need

Innovation will be critical to meeting the GHG reduction goals set forth in this Plan. That's true within Michigan and in a global sense.

As we brought in experts from around the country to present the latest ideas and research to the Council on Climate Solutions, they consistently noted that we already have developed many of the solutions we need to decarbonize our economy. But in area after area—from energy production to transportation and working lands—they noted that we still need to identify, operationalize, and/or perfect new technologies and strategies to deliver the final percentage points in the push for 100% carbon neutrality. While we would love to see Michigan discover and benefit from those decisive or game-changing innovations, they could come from anywhere.

At the same time, states and communities will serve as laboratories for innovation on smaller scales. In wrestling with the challenges and complexities of squeezing every last measure of carbon out of their economies, climate leaders and residents at every level will identify and experiment with creative solutions that will serve their unique needs and provide models for others to adopt.

In the meetings of the Michigan Council on Climate Solutions and deliberations of its five topical workgroups, several potential innovations of this nature—and areas where creative thinking and problem solving are especially needed—were identified. While most of those are captured in the appendices to this Plan, the following briefly summarizes a few examples to stimulate thought and conversation.

Clean industrial hubs.

Energy intensive industries are a difficult piece of the decarbonization puzzle because they produce important products like chemicals, iron, steel, food, and cement using specific manufacturing processes that involve GHG emissions (and often require a lot of power). In many cases, achieving reductions in those industry-unique “process emissions” will take research and development over time.¹

As one of its recommendations, the Council on Climate Solution's Energy-Intensive Industry Workgroup suggested Michigan explore the creation of clean industrial hubs that could “achieve greenhouse gas emissions reductions as cost effectively as possible through shared infrastructure, the efficient co-location of industrial facilities, and the efficient use of materials and energy streams.” Innovative reuse of emissions and material byproducts of manufacturing—before they are discarded or released to the atmosphere—could also reduce other pollution and environmental impacts from manufacturing.

Importantly, the workgroup noted the potential Environment Justice issues associated with co-locating multiple facilities and deciding where to site these hubs and the need to pay special attention to working with potentially impacted communities.

Electrification of buildings and homes.

The electrification of Michigan homes and business is a promising tool for reducing carbon emissions. As emerging innovations increase its cost effectiveness, electrification also has the potential to save residents real money on their utility bills. The switch to electric heating and other appliances may also yield health benefits, such as helping to reduce the risk of respiratory symptoms associated with gas stove use.^[1]

The Building and Housing Workgroup highlighted the need for further analysis in this area, recommending that the state “[s]tudy and consider the electrification of building appliances as a pathway to reduce and eliminate direct emissions from the building sector” and “study and account for the impacts of building electrification on the grid, the gas distribution system, and on low-income and energy burdened residents.” Such an electrification study should be Michigan-specific, as many of the relevant variables are highly dependent on local energy prices, demand charges, and the quantity and time of energy use.^[2]

While future Michigan-specific analysis will help to clarify the optimal role of electrification in the state’s decarbonization efforts while balancing the need to address residents’ energy burden, some level of electrification of buildings and housing may already be cost-effective.

According to research from RMI and Rewiring America, at least 39% of Michigan households—or 1.5 million households—could save a total of \$710 million a year on energy bills if they were using modern heat pump space heaters and heat pump water heaters instead of their current machines. That’s an average savings per household of \$460 each year.^[3] Half of the households with immediate savings potential are considered low- and moderate-income, pointing to the importance of some level of housing electrification in addressing the energy burden challenge.^[4]

Due to Michigan’s colder climate, some buildings may be suited to dual-fuel systems that use air source heat pumps for significant heating loads, with natural gas furnace backups for cold weather days. Importantly, in order to most effectively reduce the energy burden for low- and moderate-income households, electrification efforts should prioritize technologies and utility rate designs that offer energy efficiency and value demand flexibility.^[5]

^[1] See Asthma Initiative of Michigan, available at <https://getasthmahelp.org/indoor-air-quality.aspx>

^[2] See New Buildings Institute, The Building Electrification Technology Roadmap (January 2021), p. 7, available at <https://newbuildings.org/resource/building-electrification-technology-roadmap/>

^[3] Rewiring America, Benefits of Electrification – Michigan, available at <https://map.rewiringamerica.org/states/michigan-mi>

^[4] See Rewiring America, Benefits of Electrification – Michigan, available at <https://map.rewiringamerica.org/states/michigan-mi>

^[5] See New Buildings Institute, The Building Electrification Technology Roadmap (January 2021), p. 5, available at <https://newbuildings.org/resource/building-electrification-technology-roadmap/>

Closing the digital/broadband divide.

According to the Bipartisan Policy Center: “Expanding broadband services to currently underserved communities has the potential to create lasting economic, educational, and health benefits. Perhaps less apparent, yet no less important, the expansion of broadband connectivity can also contribute to mitigating and adapting to the risks of climate change.”²

As mentioned above, the Michigan Council on Future Mobility and Electrification recently noted that software will soon replace hardware as the most valuable componentry in a car. Indeed, most of the changes we anticipate now on the road to decarbonization will involve various systems communicating with each other and with the people managing and using them.

For example, we will communicate with our homes’ heating and power systems, which will communicate with our electricity grid, which will include a rich network of ongoing communications among operators, customers, and suppliers. To the extent Michiganders lack reliable access to fast internet, they will lose out on some of the economic, health, environmental, and other benefits that will accompany this change to greater real-time, dynamic information movement in important aspects of our lives. They will also be left at risk and at a disadvantage when it comes to adapting to climate change as immediate access to reliable information will be critical in responding to extreme weather events that often emerge with little notice and involve impacts that we can help mitigate with every second of forewarning and preparation.

In June 2021, Governor Whitmer established the Michigan High-Speed Internet Office, with a designated Chief Connectivity Officer as its head. The Michigan High-Speed Internet Office is charged with coordinating all state, federal, philanthropic and private investments made into broadband infrastructure and its utilization. Governor Whitmer also signed Executive Directive 2021-2 to help bridge the digital divide, with a goal of ensuring that every home and business in Michigan can access high-speed internet services that meet their needs.³

According to Executive Directive 2021-2: “Achieving this goal requires a multi-faceted approach, including developing the necessary infrastructure to bring service to each home and business in our state, assisting those who otherwise could not afford service, and ensuring that resources to increase digital literacy are available to all.”⁴ For example, in support of this goal: “The MPSC has partnered with Connected Nation Michigan to develop an interactive statewide broadband availability map and to promote increased residential and business broadband access and adoption throughout Michigan.”⁵

Our state's efforts to address the climate crisis should be integrated into, support, and help shape these ongoing efforts to bridge the digital divide. It is an area in which innovation will be continuously needed and can support strategies to reduce GHG emissions.

Natural features and food.

The Natural Working Lands and Forest Products Workgroup provided the Council on Climate Solutions powerful research on how we can curb emissions and capture carbon – while enriching our quality of life – by nurturing healthy soils in our agricultural lands and sustaining the abundant wetlands and forests in our state.

There are existing programs at the state and local levels that indirectly reduce emissions in all these areas – soils, wetlands, and forests. Building from that foundation, Michigan can substantially contribute to its decarbonization goals by recognizing their significance in the climate crisis context. By proactively seeking creative solutions, we will put our natural systems to work to reduce GHG emissions.

With 11.8 million acres of agricultural land in Michigan, there is an enormous opportunity to sequester atmospheric carbon, rebuild soil health by increasing organic carbon, and reduce methane and nitrous oxide emissions. Agricultural conservation best management practices, such as no-till and cover crops, increase soil carbon stocks while reducing soil erosion and chemical runoff. To this end, the workgroup recommended that the state develop legislation and allocate funds to support farmers who pursue conservation best management practices.

Innovation around soil amendments can also reduce emissions and improve agricultural conservation. Amending soils with compost or biochar can reduce demand for energy-intensive chemical fertilizers and improve soil's capacity to sequester carbon. Of Michigan's total municipal solid waste currently sent to landfills, 38% is organic material that could be recovered (Resource Recycling Systems, 2019) and converted into compost or biochar. That waste could fuel a vibrant compost industry in Michigan and support farmers rather than emit GHGs from a landfill.

With that in mind, the materials decarbonization ad hoc council workgroup recommended that Michigan formally “adopt and pursue the joint USDA/USEPA goal to reduce food loss and waste by half no later than 2030, and actively support municipalities and the private sector in deploying best available composting and anaerobic digestion technologies to divert food and other organics from landfills.”

Prioritizing Michigan's wetlands and waterways is also critical to economic growth, ecological function, and building healthy, resilient communities. Wetlands are important stores of carbon. Restoring them can create a powerful carbon sink, and preserving existing wetlands ensures stored carbon does not escape. In addition, wetlands help keep pollution out of our waterways and protect our communities from flood damage.

The workgroup recommended protecting wetlands wherever possible and replacing outdated 'hard' infrastructure with green infrastructure while ensuring that plans uphold equity and inclusion.

Similarly, Michigan's forests currently store approximately 2,045 million tons of total forest ecosystem carbon while also sequestering atmospheric carbon every year. In addition to their sequestration value, planting trees in our cities and towns can reduce the urban heat island effect, reduce tree inequity, and improve the health and well-being of urban residents

Michigan should proactively engage stakeholders and foster conditions favorable to leveraging the climate benefits of natural and working lands. The state should ensure our planning and decision-making processes support sustaining and improving our soil, wetlands, and forests as we progress toward 2050.

State of Michigan Efforts: In order to meet the moment, every department must be a climate department

In 2019, the governor's office launched an interdepartmental workgroup to identify opportunities for state government to lead by example and use administrative powers to address climate change. This work focused on how the state could incorporate climate mitigation and adaptation into existing state programs and identify initiatives that departments could pursue to accelerate the transition toward carbon neutrality. While the following does not fully encompass the climate-related work of state government, it highlights a handful of examples of agency work to lead on climate change.

Leading by example.

- **Elevating climate and justice by increasing coordination and dedicating resources.** Created new offices to lead climate and environmental justice work across state government including the Office of Climate and Energy, Office of the Environmental Justice Public Advocate, and Office of Future Mobility and Electrification.
- **Using renewable energy, reducing energy use, and decarbonizing buildings.** Implemented a plan to power state-owned facilities with 100% renewable energy by 2025. Committed to reduce energy usage in state-owned facilities 40% by 2040 and work towards carbon neutral state-owned buildings by 2040. Required all state facilities to offer recycling services. Invested \$5 million into a revolving fund to expand renewable energy and energy efficiency projects at state facilities.
- **Siting renewable energy on state properties and lands.** Developed a plan to responsibly site solar across our state-owned lands and properties. Highlights include powering the Oden State Fish Hatchery and Seven Lakes State Park Hatchery with 100% renewable energy. Identified opportunities to reclassify lands to allow them to be used for solar development.
- **Providing tools to state agencies and employees.** Developed a toolkit for state agencies to review sustainability projects on state properties and ensure easy access to information on how to initiate eco-friendly practices. Launched a state employee education campaign around sustainability.
- **Creating tools for public partners.** Developed tools for communities like 'Catalyst Communities,' a comprehensive initiative to provide education, training, planning and technical resources to local public officials as they prepare for climate impacts; a renewable energy zoning database to help communities and

renewable energy developers identify the best locations for renewable energy; and the 'Climate and Health Adaptation Planning Guide' to help communities integrate climate and environmental health concepts into existing community planning and decision making.

Incorporating climate into state programs.

- **Treasury.** The Department of Treasury launched the Energy Transition Impact Project to help communities and workers plan for the closure of coal plants in a way that ensures that no one is left behind in the transition to a clean energy future.
- **EGLE.** The Department of Environment, Great Lakes, and Energy developed 'Next Cycle Michigan' to grow Michigan's recycled materials supply chain and end markets.
- **DNR.** The Department of Natural Resources incorporated climate mitigation as a key pillar in their 'Public Land Strategy' to ensure the department identified appropriate strategies for emerging, climate-based threats to natural resources.
- **LEO.** The Department of Labor and Economic Opportunity expanded existing job training and workforce development programs to include clean energy and mobility opportunities like the 'EV Jobs Academy.'
- **MDOT.** The Department of Transportation developed a long-range transportation plan, Mobility 2045, that included preparing transportation systems for the challenges of climate change and incorporating innovative technologies.

Roadmap to a carbon-neutral 2050 (Under Construction)

While the Plan above focuses on the next decade of action, we must work to decarbonize every sector of the economy. In this section, the Plan will discuss the steps required to our long-term goals.

Over the coming months, this roadmap will be further informed with modeling and analysis focused on greenhouse gas emissions reductions, equity impacts, and cost-effectiveness and will be finalized with input from the Council on Climate Solutions and other engaged stakeholders to identify what comes next and how to prioritize actions that reach our emissions goals, improve equity, and support a vibrant Michigan economy.

How to get involved (Under Construction)

Success of the Plan will require engagement at every level of government as well as the collective action of residents across the state. It is the State's intention to assist in connecting individuals, communities, and groups across the state to help leverage existing efforts to address climate change.

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Appendices

- I. Summary of Key Recommendations from workgroups
- II. Workgroup summaries of Key Recommendations presented to the Council on Climate Solutions

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